

## CLAIMS

1. An electrolyte membrane-electrode assembly comprising a hydrogen ion conductive polymer electrolyte membrane and a pair of electrodes sandwiching the polymer electrolyte membrane therebetween, said electrode comprising a catalyst layer and a gas diffusion layer attached to said polymer electrolyte membrane, characterized in that

    said gas diffusion layer comprises a fabric having a warp thread and a weft thread which are made of carbon fiber, and

    the distance X between adjacent intersections where said warp and weft threads cross each other and the thickness Y of said fabric satisfy the equation:  $1.4 \leq X/Y \leq 3.5$ .

2. The electrolyte membrane-electrode assembly in accordance with claim 1, wherein the height A and the width B of said warp thread, and the height C and the width D of said weft thread respectively satisfy  $0.2 \leq A/B \leq 0.4$  and  $0.1 \leq C/D \leq 0.4$ .

3. The electrolyte membrane-electrode assembly in accordance with claim 1, wherein the height C and the width D of said weft thread disposed vertically to said consecutive warp thread satisfy  $0.1 \leq C/D \leq 0.3$ .

4. The electrolyte membrane-electrode assembly in accordance with claim 1, wherein said substrate has a water repellent layer comprising a carbon fine powder and a water

repellent resin on the surface of said substrate on said catalyst layer side, and said water repellent layer has a thickness of 1 to 50  $\mu\text{m}$ .

5. The electrolyte membrane-electrode assembly in accordance with claim 1, wherein said polymer electrolyte membrane has a thickness of 9 to 50  $\mu\text{m}$ .

6. The electrolyte membrane-electrode assembly in accordance with claim 1, wherein said catalyst layer has a thickness of 1 to 30  $\mu\text{m}$ .

7. A polymer electrolyte fuel cell characterized in that said fuel cell comprising:

(1) an electrolyte membrane-electrode assembly comprising a hydrogen ion conductive polymer electrolyte membrane and a pair of electrodes sandwiching said polymer electrolyte membrane therebetween, said electrode comprising a catalyst layer attached to the polymer electrolyte membrane and a gas diffusion layer, said gas diffusion layer comprising a fabric comprising a warp thread and a weft thread which are made of carbon fiber, the distance X between adjacent intersections where said warp and weft threads cross each other and the thickness Y of said fabric satisfying the equation:  $1.4 \leq X/Y \leq 3.5$ ;

(2) a pair of conductive separator plates having a gas channel on the face in contact with said gas diffusion layer of said electrolyte membrane-electrode assembly and sandwiching said electrolyte membrane-electrode assembly such

that said separator plate is attached to said gas diffusion layer of the electrolyte membrane-electrode assembly,

a clamping pressure of 1 to 20 kgf/cm<sup>2</sup> being applied per the area where each of said electrodes and each of said conductive separator plates are in contact with each other.

8. A method for producing an electrolyte membrane-electrode assembly comprising a hydrogen ion conductive polymer electrolyte membrane and a pair of electrodes comprising a catalyst layer and said gas diffusion layer and sandwiching said hydrogen ion conductive polymer electrolyte membrane such that each of said catalyst layer is in contact with the polymer electrolyte membrane, said method being characterized in that

the rough surface of said carbon fabric is smoothed by heating the surface of said gas diffusion layer before disposing said gas diffusion layer on said polymer electrolyte membrane.